

Effects of freeze/thaw cycles and gas purges on the performance degradation of direct methanol fuel cell

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Performance degradation of direct methanol fuel cell (DMFC) was investigated by freeze/thaw cycle. To analysis the temperature effect, the freeze/thaw cycles were performed from two freeze temperature (-32°C , -20°C) to 60°C . Details of causes of performance degradation were observed by single cell and EIS measurement and CV measurement, SEM measurement. Different purging effects named anode/cathode purge, cathode purge, no purge were adopted for comparisons. The cells purged by nitrogen gas were found to have little performance loss than the cell which was not purged during freeze/thaw cycles. Cell resistance change and ECSAs of the DMFC with gas purge also was smaller Air purge showed similar influences on DMFC performance and impedance with nitrogen gas purge. These results showed DMFC performance had relationship with the water amount in the cell at sub-zero temperature.